

WIRED AND WIRELESS DOCKING STATION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to personal computers and docking stations, also known as port replicators. More specifically, the present invention relates to a docking station that is able to support both wired and wireless docking. The docking station can be used to connect a portable computer via a wired or wireless channel of communication, thereby coupling the computer with a network and peripheral devices such as a monitor, keyboard, optical drive or mouse. The docking station may also be modular, and an embodiment of the docking station may be used to retrofit existing docking stations that only support wired connections to allow them to also support a wireless connection.

2. Description of the Related Art

The following descriptions and examples are not admitted to be prior art by virtue of their inclusion within this section.

Portable personal computers (PCs), including tablet PCs, laptop computers, and personal digital assistants (PDAs), allow computer users to utilize many of the functions of a personal computer while facilitating freedom of movement about the workplace. Particularly, tablet PCs can offer a very high level of mobility and flexibility to the user. Tablet PCs are often used in the medical profession, where a doctor or nurse can use the tablet PC in place of a pen and paper. The tablet PC allows users to easily update files electronically while also recording data on a single device and moving from point to point. Tablet PCs are also common in manufacturing and warehouse environments, where users benefit from being able to remain mobile and use a single device to electronically record data from many locations for the purposes of keeping track of inventory, performing inspections and managing workloads.

Portable computers are generally lightweight and compact, but may compare unfavorably to desktop computers in some respects because they are equipped with smaller keyboards and displays. Further, some portable computers may not have a keyboard, mouse, printer ability, local area network (LAN) connection, or an optical drive. To overcome these shortcomings, many portable computer users connect their computer to a docking station when they are using their computer in an office environment. The docking station can equip the portable computer with most of the characteristics of a desktop computer. Generally, a docking station has a power source to charge the battery of the computer in addition to numerous ports that provide connectivity to local area networks and peripheral devices such as optical drives, monitors, printers, keyboards, and mice. A user typically initiates a docking session by establishing a physical connection between the docking station and the portable computer, usually by engaging corresponding connectors of the portable computer and docking station. When the physical connection is made between the laptop and the docking station, the docking station provides the portable computer with access to the necessary ports and any connected peripheral devices. Because the docking stations serve as an intermediate connection between a portable computer and a number of ports by replicating the ports found on many computers, docking stations are also referred to as port replicators.

FIG. 1 is a block diagram showing a common docking system configuration. The system includes a portable computer 12 and a docking station 16 connected to an optical

drive 18, a mouse 20, a monitor 22, a printer 24, a keyboard 26, a high speed network connection 28, and possibly other input/output devices or peripheral devices. Most portable computers require multiple individual physical (mechanical/electrical) connections to attach a standard set of peripherals such as those shown in FIG. 1. The use of a docking station allows a user to replace the individual connections to each peripheral device with a single connection 14 to the docking station 16.

Most docking station architectures function by extending an internal bus bridge, such as PCI or PCI Express, of the portable computer to the docking station. Other architectures extend discrete buses, such as USB, VGA, and audio, to the docking station where they can connect to each of the peripherals via replicated ports. The replicated ports may include a variety of interfaces, such as USB ports, an IEEE 1284 parallel port, an RS232 serial port, PS/2 style mouse and keyboard connectors, VGA and/or DVI-style display (monitor) connections, an RJ45 Ethernet port, IEEE 1394 (Firewire), modem flash card ports such as Sony's Memory Stick, Compact Flash, and others. The typical interface between the docking station and the portable computer uses a specialized, self-aligning high-pincount connector assembly. Because of the complexity and repeated mechanical connection and disconnection of this connector, the connector is expensive and susceptible to fatigue related failure. Another expensive attribute of the physical docking station connector is that the surfaces usually require alignment features to prevent damage to the pins caused by a misaligned connection attempt.

Since the shape of the connector makes it difficult to clean, the connector is also a place for dirt or germs to accumulate on the portable computer. Dirt from contaminant-heavy work environments such as cars, work sites, and warehouses can cause the docking connector to fail, which may require the replacement of the computer. Similarly, germs may contaminate the connector of a computer used in a healthcare oriented workspace, such as a hospital, nursing home, or clinic. If a computer becomes contaminated, it can spread germs or infection when it comes into contact with people or communicates the germs to a docking station, which would in turn contaminate other computers and people. Thus, it is desirable to devise another way to connect a portable computer to a docking station.

Some docking stations attempt to simplify the docking connection by using a USB connection in the place of the high-pincount connector. While the USB interface provides a more simple connection than that of the traditional docking connector, these docking stations suffer a bandwidth constraint because the USB interface does not have enough bandwidth to support the data rates associated with a monitor display signal combined with data transfers necessary to operate the peripheral devices. Thus, any improved docking station should take the need for a high bandwidth connection into consideration.

SUMMARY OF THE INVENTION

Many of the shortcomings of a traditional wired docking station may be overcome by a wireless docking system. In particular, a computer that is able to wirelessly dock to a docking station via a high speed wireless connection may add mobility and flexibility to a workspace. Further, a docking system that is able to support both wired and wireless docking session is of additional value because it gives a computer user the flexibility and mobility of a